

No. 266, JUNE 2008



*C.D. Howe Institute*  
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# C.D. Howe Institute COMMENTARY

THE PENSION PAPERS

## Risky Assumptions:

A Closer Look at the Bearing of Investment Risk  
in Defined-Benefit Pension Plans

James E. Pesando



### In this issue...

There is reason to question whether employers bear all – and employees none – of the investment risk in defined-benefit pension plans. So are they just defined-contribution plans in disguise?

## THE STUDY IN BRIEF

### THE AUTHOR OF THIS ISSUE

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\$12.00; ISBN 0-88806-746-1  
ISSN 0824-8001 (print);  
ISSN 1703-0765 (online)

With the relative decline of defined-benefit (DB) pension plans in Canada, pension experts have stepped up their focus on the relative advantages of DB plans compared to defined-contribution (DC) plans, and whether steps should be taken to shore up the popularity of DB plans.

Common perception has it that in DB plans, plan *sponsors* (firms) bear the investment risk, and in DC plans, plan members bear the risk. The purpose of this study is to explore the question of how the bearing of investment risk is distributed in DB plans. This task requires a closer look at the proposition that employer-sponsored pension plans represent deferred wages. This closer look, in turn, requires a re-examination of how employers and their employees “trade off” pension benefits for other components in the total compensation package.

The key findings of the paper include:

- The defined-benefit formula notwithstanding, *members* of DB plans may bear substantial investment risk. The key issue is the extent to which members of DB plans grant wage or other concessions based on the contributions made by the plan sponsor, including any additional contributions required as a result of investment shortfalls.
- Even if members of DB plans bear substantial investment risk, there is a fundamental difference between risk bearing in DB and in DC plans. In DB plans, unlike DC plans, there exists the possibility of *intergenerational* risk sharing.
- In a DB plan, but not in a DC plan, the financial consequences of the adverse investment outcome would be shared by all members of the plan. The potential for intergenerational risk sharing (or insurance) in DB plans is an important and an attractive feature of these plans.
- While there is a strong case for clarifying the ownership rights to investment surpluses that may emerge in DB plans, the argument that sponsors are entitled to plan surpluses *because* they bear all of the downside risk of investment performance may not withstand closer scrutiny.

This paper focuses attention on the uncertain state of our knowledge regarding the manner in which wages or other forms of compensation are “traded off” for pensions in DB plans. The paper also reminds the reader that, based on economic analysis, employees ultimately bear the cost of DB (and DC plans), even if the employer and the employee ostensibly “share” these costs.

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Pension plan coverage for Canadians is evolving in both its nature and extent, raising concerns about the potential implications for the pension system and its participants. Statistics Canada reports that, between 2002 and 2006, membership in defined-benefit pension (DB) plans increased by 1.45 percent (from 4,534,941 to 4,600,581 members). However, membership in defined-contribution (DC) plans increased by 12.22 percent (from 796,088 to 893,403 members).

As a result, there has been a relative decline in the importance of defined-benefit plans in Canada.<sup>1</sup> Meanwhile, the proportion of the labour force in Canada that is covered by employer-sponsored pension plans continues to decline, from 44.2 percent of paid workers in 1985 to 38.5 percent in 2005.

Pension plan experts, with considerable consternation, are examining the potential implications of these trends. In particular, the relative decline of DB plans has served to focus renewed attention on their advantages and disadvantages compared to defined-contribution plans,<sup>2</sup> and whether efforts should be made to shore up the popularity of DB plans. For example, the Guiding Principles of the Ontario Expert Commission on Pensions answer the latter

question in the affirmative. They underline: “the importance of maintaining and encouraging the system of defined benefit plans in Ontario.”<sup>3</sup> One frequently raised concern is that members of DC plans bear all of the investment risk. As a result, many commentators view the relative decline in DB-plan coverage as shifting additional risk to plan members, with an attendant increase in the degree of uncertainty as to the amounts of the pensions to be delivered by Canada’s system of occupational pension plans. In a Discussion Paper released in February 2007, the Ontario Expert Commission wrote:

Defined benefit pensions are fixed, rather than tied to fluctuations in the sponsor’s business fortunes or to investment returns experienced by the plan. Accordingly, the risks associated with low investment income, for example, are borne by the sponsor(s) of the plan. (Page 3).

The purpose of this study is to explore the question of how the bearing of investment risk is distributed in DB plans. This task requires a closer look at the proposition that employer-sponsored pension plans represent deferred wages.<sup>4</sup> This closer look, in turn, requires a re-examination of how employers and their employees “trade off” pension benefits for other components in the total compensation package.

This *Commentary* is organized as follows. First, I provide background on the widely accepted definitions of DB and DC plans and the related, overly simplistic assumptions about who bears risk in them. Second, I review the concept of

The author thanks the members of the C.D. Howe Institute's Pension Advisory Panel for their useful comments.

- 1 I have been advised that the data compiled by Statistics Canada may understate the increase in membership in DC plans. Such would be the case, for example, if Statistics Canada were to treat all members in a closed DB plan as DB plan members even if new members are effectively DC plan members.
- 2 The relative decline of DB plans, which is less pronounced in Canada than in the United States, also raises the question of why these plans have become less attractive to employers in the private sector.
- 3 The Minister of Finance in Ontario, in November 2006, appointed an Expert Commission on Pensions “to examine the legislation that governs the funding of defined benefit pension plans in Ontario, the rules relating to pension deficits and surpluses and other issues relating to the security, viability and sustainability of the pension system in Ontario.” (“Improving Ontario’s Pension System: Ontario Expert Commission on Pensions’ Terms of Reference.” November 2006).
- 4 In the early policy literature, pension plans were often viewed as reflecting the generosity of a benevolent employer, rather than a benefit for which employees paid by making concessions elsewhere in their compensation package.

employer-sponsored pensions as deferred wages. Third, I discuss the type of labour market in which members of DB plans could not be forced to bear any investment risk, but note that it is not the type of labour market in which firms would sponsor DB plans. Fourth, I review the incomplete state of our current understanding of the manner in which wages and other benefits are traded off for pensions in DB plans. Fifth, I discuss the capacity for intergenerational risk sharing in DB plans, which differentiates these plans in an important way from DC plans. Finally, I draw together the implications of this analysis for an understanding of the way in which the bearing of investment risk differs in DB from DC plans.

The key findings of the paper include:

- The defined-benefit formula notwithstanding, members of DB plans *may* bear substantial investment risk. The key issue is the extent to which members of DB plans grant wage or other concessions based on the contributions made by the plan sponsor, including any additional contributions required as a result of investment shortfalls, rather than the defined-benefit formula. Even if members of DB plans bear substantial investment risk, there is a fundamental difference between risk bearing in DB and in DC plans. In DB plans, unlike DC plans, there exists the possibility of *intergenerational* risk sharing. In a DC plan, if there is an adverse investment outcome as a member approaches retirement, the unfortunate consequence may be a significant decline in the pension (annuity) that can be purchased with the accumulated investment proceeds. In a DB plan, the financial consequences of the adverse investment outcome would be shared by all members of the plan. The potential for intergenerational risk sharing (or insurance) in DB plans is an important and an attractive feature of these plans.<sup>5</sup>
- While there is a strong case for clarifying the ownership rights to investment surpluses that may emerge in DB plans, ownership claims by plan

sponsors cannot be reliably based on the argument that plan members do not participate in the downside risk of investment outcomes. The argument that sponsors are entitled to plan surpluses *because* they bear all of the downside risk of investment performance may not withstand closer scrutiny.

In a research paper prepared for Ontario's Expert Commission on Pensions, entitled "Arguments about Asymmetry of Risks and Rewards and Deferred Wages in Pension Plans," James Wooten concludes: "If a plan is ongoing, employers bear the burden of a deficit caused by adverse investment experience or other actuarial losses." In arriving at this conclusion, Wooten draws attention to the fact that because "employers are legally obligated to fund deficits, it is difficult for them to shift this burden to employees." Although employers may bear the initial cost of these contributions, it does not follow that these costs cannot ultimately be shifted back to employees.

In addressing the above issues, this paper focuses attention on the uncertain state of our knowledge regarding the manner in which wages or other forms of compensation are "traded off" for pensions in DB plans. The paper also reminds the reader that, based on economic analysis, employees ultimately bear the cost of DB (and DC plans), even if the employer and the employee ostensibly "share" these costs.<sup>6</sup>

## The Background: Standard Definitions and Overly Simple Assumptions

In DB plans, the pension due at retirement is determined by a formula that links the pension to the member's years of service and earnings or, as is generally the case in the unionized private sector, to the member's years of service multiplied by a fixed dollar amount. To finance the promised pension payments, the employer is required to set up a pension fund, and is legally responsible to make additional

5 There is no reason that intergenerational sharing of investment risk should favour one age cohort over another. By contrast, if life expectancies continue to rise and additional contributions are required as a consequence, there could be a net transfer of funds from younger to older age cohorts.

6 This comment assumes that the total compensation of workers is determined in competitive labour markets, as would be the case in the private sector.

contributions if the return on the fund is below the rate deemed necessary to discharge the pension obligations.

In DC plans, the pension due at retirement is equal to the accumulated value of the contributions made on the member's behalf. The replacement rate, which is the ratio of the member's pension to the member's earnings just prior to retirement and serves as the standard measure of pension adequacy, is inherently uncertain since the accumulated value of contributions depends upon the investment performance of the pension fund.

In textbook descriptions, the fundamental difference between DB and DC plans resides in the bearing of investment risk. Plan *sponsors* bear investment risk in DB plans, while plan *members* bear investment risk in DC plans. In DC plans, the inherent uncertainty in the replacement rate is a cause for concern in the view of some commentators, who call for policy initiatives designed to reverse the relative decline in DB plans in order to provide more certain pensions for plan members.

The textbook description of the bearing of investment risk in DB plans, even to a casual observer, is too simple. Many would point to the legal uncertainty as to the ownership of plan surpluses that emerge from favourable investment performance.<sup>7</sup> If employees share in plan surpluses that emerge from favourable investment performance, but plan sponsors are legally required to finance shortfalls, the bearing of investment risk in DB plans is asymmetric. To address this issue, and to relieve the potential disincentive for sponsors of DB plans to fully fund their plans, some observers have recommended that the legal status

of pension surpluses be clarified to provide plan sponsors with an unambiguous claim to surpluses arising from favourable investment performance.

The above description of the bearing of investment risk in DB plans, although more complicated than in the textbook treatment, is still too simple. In particular, it is not clear that plan members may participate only in surpluses that arise from favourable investment performance. There is reason to suspect that they may ultimately bear the consequences of plan deficits as well.

### *Who Ultimately Bears the Risk in DB Plans?*

Economists distinguish between the *impact* of a tax and its *ultimate incidence* in recognition of the fact that the ultimate burden of a tax – who ultimately pays the tax – is likely to reflect the time elapsed since its introduction and the behaviour of the affected agents. For example, although a statute might provide that a payroll tax is to be paid by the employer, the ultimate incidence of the tax may fall upon employees through a combination of wage and/or price adjustments.<sup>8</sup>

In principle, the ultimate incidence of additional employer contributions to a DB plan required by poor investment performance could fall exclusively upon employees. If there is an unanticipated shortfall, due to adverse investment outcomes, employees could eventually bear the cost through reductions elsewhere in their compensation package, or in the case of contributory plans, by increases in the employee contribution rate.<sup>9</sup> Conversely, if investment

7 For a recent review of important court decisions as to the ownership of plan surpluses in DB plans in Canada, see Selody (2007).

8 Because the supply of labour is very inelastic in the long run (i.e., insensitive to changes in the real wage rate), economic analysis indicates that the burden of employer contributions to the Canada Pension Plan is borne mostly by workers. This appears to be the understanding of most policymakers as well.

9 In response to the sharp decline in the level of the risk-free real interest rate (as evidenced by the real interest rate on the Real Return Bonds of the Government of Canada), the Ontario Teachers' Pension Plan has lowered its estimate of the long-term, risk-free rate of return to 2.5 percent. As a result, employer and employee contribution rates have been increased sharply, from 7.3 percent of earnings up to the Year's Maximum Pensionable Earnings (YMPE) and 8.9 percent of earnings in excess of the YMPE in 2006 to 10.4 percent of earnings up to the YMPE and 12.0 percent of earnings in excess of the YMPE in 2009. The reduction in the assumed risk-free real rate of return going forward might be treated, for analytical purposes, as the equivalent to a series of realized investment returns beneath the level that had previously been projected.

The fact that the employer contribution rate has been increased does not imply that the employer ultimately bears this cost, a point well understood by economists. The experience with the Teachers' Pension Plan raises the interesting question of whether the implicit risk sharing is different between, on one hand, DB plans that set high contribution rates by costing using a risk-free interest rate and, on the other hand, plans where contribution rates are lower based on costing with a higher interest rate consistent with the plan holding riskier assets.

performance is unexpectedly strong and employer contributions decline, then employees could eventually receive higher wages or greater benefits than would otherwise be the case. If so, it would be plan members – not employers – that bear investment risk in DB plans.

If the full incidence of employer contributions ultimately falls upon employees, members of DB plans would bear investment risk in a manner similar to members of DC plans. The impact, however, would differ. In DB plans, fluctuations in investment performance would result in changes in the wage or other concessions required to pay for pension benefits. In DC plans, fluctuations in investment performance would result in changes in the amount of the members' pensions. Risk-shifting would occur, the formal terms of the DB plan notwithstanding, if formal or informal bargaining takes into account all of the required employer contributions. The mechanism for risk shifting would be the internalization, into cash wages or other fringe benefits, of all ongoing costs to the sponsor of financing the DB plan.

## Pension Benefits as Deferred Wages

The notion that the pensions provided by employers represent deferred wages is widely accepted by economists. In his research report prepared for Ontario's Expert Commission on Pensions, Professor Morley Gunderson writes: "... the most reasonable conclusion is that there is some evidence of a trade-off between wages and pension benefits, but the evidence is at best fragile."

This is a less than overwhelming endorsement of the view that pensions represent deferred wages. However, as noted by Professor Gunderson, the empirical task of identifying the trade-off between wages and pensions is made difficult by severe limitations in the requisite data. Where pensions are the subject of explicit negotiations, as in collective bargaining, the evidence of a trade-off is strongest.

To an economist, the view that pensions are deferred wages is motivated largely by principle. If

workers do not ultimately bear the cost of pensions (and ignoring any indirect benefit to firms of sponsoring pension plans, such as incentive effects), firms that sponsor pension plans are providing a gratuitous transfer of wealth from shareholders to employees. To an economist, this is not a reasonable result.

### *Diverging Views: Do Employers or Employees Pay the Cost of Contributions?*

It merits note that the comments of many observers suggest that employers – not employees – are likely to bear the cost of employer contributions to DB plans. Ontario's Expert Commission on Pensions, in its Discussion Paper, writes:

These recent changes in the asset mix of pension funds, in their increased volatility, in their actuarial valuation and in accounting practices, have all triggered demands for sponsoring employers to increase contributions to their pension plans in order to avoid or retire deficits. Arguably, these increased contribution levels may have two effects. First, they may persuade employers to postpone or resist the introduction of additional benefits. Second, employers may increasingly come to perceive pensions as a major cost centre, to focus on the difficulties of managing the volatility of pension costs, and to seek ways to mitigate their pension risk, all to the potential detriment of defined benefit plans and the workers who depend on them. (Page 6).

The divergence between the economists' view that pensions are deferred wages and the frequent references in the writing of non-economists to the effect that employers bear the costs of higher plan contributions may reflect the difference between the initial and the ultimate incidence of higher employer contributions. If labour markets are competitive, and if employees value one dollar

(present value) of pension benefits as much as one dollar of wages, then – through a combination of wage and/or price adjustments – the higher employer contributions will ultimately be shifted to plan members.

What exactly does it mean to say that pensions are deferred wages and that workers “pay” for the DB pensions to which they become entitled by concessions elsewhere in their total compensation?

A straightforward answer might be that employees forgo wages in a given period equal to the present value of the pension benefit to which they become entitled during that period.<sup>10</sup> In this event, the wages forgone by DB members would depend upon neither the size of the employer’s (normal) contribution, which could vary for a given benefit formula with the actuarial assumptions adopted by the employer, nor any special contributions required by the employer to finance an unanticipated funding deficit.

Selody (2007), in contrast, offers an explicit statement of the way in which wages might be traded off for employer contributions in DB plans. Selody writes:

Contributions can be made either directly by members or indirectly by employers on behalf of members. Conceptually, it does not matter who makes the contributions, since all contributions are part of members’ total compensation and are earned by members. The employer sets total compensation (cash and benefits) to a competitive value determined by

market forces. This value will converge over time to the marginal product of the members’ labour contribution to the firm on average. Contributions are distinct from sponsor injections and withdrawals into and out of the pension fund. Sponsor injections and withdrawals are a claim on the shareholder equity or wealth of the sponsor. (Page 3).

Selody suggests that workers “pay” for the *normal* contributions to the plan made by the employer, in the form of reduced cash wages or concessions elsewhere in the compensation package.<sup>11</sup> However, in the event of unexpectedly favourable or unfavourable investment performance, shareholders pay in the form of special contributions or withdrawals.<sup>12</sup>

The question of whether members of DB plans bargain over benefits or contributions is central to the understanding of how investment risk is distributed in DB plans. Importantly, as I show in the next section of this paper, the type of labour market in which members of DB plans would be able, theoretically, to make wage concessions solely on the basis of the defined-benefit formula is not a market in which DB plans are likely to exist.

## An Analytical Approach

Are there labour markets in which members of DB plans would be expected to bear none of the risk of uncertain investment outcomes? The answer is “yes.” However, such labour markets

10 If plan members value the present value of the pension benefit less than dollar for dollar, and thus are willing to forgo less than a dollar of cash wages for a dollar of discounted pension benefits, then the firm has no incentive to sponsor the DB plan unless there are other benefits to the firm, such as lower cost of retraining if the DB plan serves to reduce employee turnover.

A referee has suggested that, in the vast majority of cases, the “cost of pensions ... is decoupled from cash compensation.” Economic studies – for example, Gunderson, Hyatt and Pesando (1992) – find that there is a trade-off between wages and the present value of pension benefits in collectively-bargained, flat benefit plans in Ontario. In the non-union sector, it may be more difficult to find evidence of a trade-off, especially in the short run. In this context, the question of why a firm would sponsor a DB plan if it did not receive wage concessions or other advantages in the long run would have to be addressed.

11 As noted by a referee, the task of identifying normal contributions is complicated by fluctuations in the risk-free rate of interest (assuming that the promised pension benefits are, in fact, risk free).

12 Selody acknowledges that the ultimate incidence of employer contributions may differ in the event of a prolonged series of favourable or unfavourable events. Selody writes: “A shock such as a surprisingly high or low rate of return on the pension fund or an unexpected change in the longevity of members, however, will result in the sponsor having to inject or withdraw funds to secure the payment of future benefits. If the shock persists, contributions should be adjusted to reflect the shock.” (Page 3).

are also unlikely to be ones in which firms would sponsor DB plans.

Theoretically, the type of labour market in which plan sponsors would bear all of the risk for investment outcomes, and plan members none of the risk through wage concessions, is as follows. Each period, workers and firms compete in competitive markets and the total compensation of workers is set equal to the market value of workers' services. Included in the compensation package is a DB pension plan. Workers have full information and, rationally, treat the promised pension benefits as risk free since firms do not become insolvent and are legally obligated to meet their pension promises. Only firms make pension contributions, and do so at the beginning of the period. At the end of the period, when the return on the pension fund becomes known, firms make additional contributions if returns are less than projected and withdraw funds from the plan if returns are greater than projected.

In this model, all of the investment risk in DB plans is borne by plan sponsors (firms). Suppose, for example, that the investment return is less than projected, so that the plan sponsor is required to make an additional contribution. The plan sponsor cannot request that, at the beginning of the next period, workers accept total compensation less than the market value of their services in order to compensate the firm for its unplanned contribution to the DB plan. This is due to the fact that workers and firms recontract each period, and workers will not agree to work for a firm that provides a compensation package that is less than the market value of their services.<sup>13</sup>

This type of labour market undoubtedly exists in certain segments of the economy. For industries in which there is a high rate of labour turnover and/or a high incidence of firm failure, workers will be paid the market value of their labour services in each and every period in which they are employed. Such is likely to be the case, for example, for employees of small retail firms. However, in these industries, firms are not likely to sponsor DB plans, nor is there likely to be demand by workers to participate in DB plans.<sup>14</sup>

#### *The Type of Labour Markets Amenable to DB Plans*

In other labour markets, however, it is more reasonable to assume that firms and workers enter into implicit contracts with a longer time horizon. In these markets, competitive forces dictate that the present value of the worker's services is equal to the present value of the worker's compensation over the worker's expected tenure with the firm. These implicit contracts, for incentive reasons, may provide for workers being paid less than the market value of their labour services when young, and more than the market value of their labour services when old.<sup>15</sup> The key feature is that firms and workers need not "settle up" in each and every period, in light of their ongoing relationship.

This latter type of labour market is where one would expect to find firms which sponsor DB plans. Indeed, the very existence of a DB plan is premised on the firm and its employees having a long-term perspective on the employer-employee relationship. In DB plans, there is substantial "backloading" of benefits: the value of accruing

13 In this example, I assume that workers treat the pension benefits promised by firms as risk free. But what if they were not risk free? The promised pensions would be risky if the DB plan could be less than fully funded at the end of the period and if there was a possibility (non-zero probability) that the firm could experience bankruptcy.

Suppose that the DB pension plan is the only benefit. Then the wage paid to workers plus the present value of the promised pension, discounted at the risk free rate of interest, would equal the market value of the workers' services. If the pension were not risk free, the promised benefit would be discounted by a higher (risky) rate of interest, thereby requiring a smaller reduction in the cash wage in order to ensure total compensation equal to the value of labour services.

14 As noted by a referee, pensions promised by DB plans in industries where the likelihood of firm failure is high would not be risk free. The analytical example that I provide in the text is counterfactual in that the condition for members of DB plans to bear no investment risk are not likely to be met in the "real world."

15 See, for example, Lazear (1979) for the classic description of this type of implicit contract, with attention to the role of mandatory retirement as a truncation device. DB plans may help employers attract, through self-selection, employees with a longer-term commitment to the firm. DB plans, which "back load" the accrual of benefits to older and long-service employees, serve to discourage employee turnover and thus reduce training costs.



benefits is much higher for long-service employees who are nearing retirement than for young employees.<sup>16</sup> As a result, DB plans may serve as a vehicle through which the deferral of compensation to a worker's older years actually occurs.

Unfortunately, for the purpose of drawing inferences as to the distribution of investment risk in DB plans, this "implicit contract" model is far less clear in its predictions. There is nothing, for example, which would preclude a firm from shifting to its employees the cost of an unanticipated increase in pension costs as a result of an investment shortfall. So long as the present value of the worker's future compensation exceeds the present value of the worker's labour services, the worker has no incentive to quit the firm.<sup>17</sup>

By contrast, in the labour markets where firms and their workers recontract in each period and thus ensure that compensation is equal to the market value of labour services in each period, there is an unambiguous prediction. Firms, not workers, would bear the investment risk in DB plans, so long as benefits can reasonably be regarded as free of default risk.<sup>18</sup> However, for the types of firms that are likely to sponsor DB plans, one would not expect workers to be paid the value of their marginal product (labour services) in each period. Under an "implicit contract" model of the long-term relationship between a firm and its workers, which would include firms

with a unionized workforce, there is no unambiguous prediction as to the distribution of investment risk. As a result, the issue of the distribution of investment risk cannot be resolved at the analytical level, but must be addressed as an empirical issue.

## Empirical Evidence

Suppose, for example, that workers grant wage concessions under the assumption that their DB pensions will be received with certainty. For this to be the case, the normal contributions required to finance the promised benefits would be calculated using the risk-free rate of interest.<sup>19</sup> In addition, the funds in the pension plan would be invested solely in the risk-free asset. If the plan sponsor chose not to invest the pension fund in the risk-free asset (i.e., the asset which would insulate shareholder equity from fluctuations in investment returns, given the plan's liabilities), there would be unanticipated increases or shortfalls in investment outcomes relative to the returns required to ensure that the plan remains fully funded. If sponsors choose to bear this risk, the wage increases received by plan members may not be affected by changes in required employer contributions arising from fluctuations in investment returns.<sup>20</sup>

16 See, for example, Gunderson and Pesando (1988). In a final earnings plan, a wage increase granted to an older, long-service worker enhances the value of a large number of past service credits. Further, the commencement of the pension is much closer, and thus less heavily discounted, for older workers.

17 Selody (2007) writes (page 5): "In reality, sponsors cannot recoup the cost of errors because they cannot unilaterally set future total compensation rates below the rate determined by market forces without undesired consequences." This is true in a labour market where workers are paid the value of their labour services in each period, for the reason stated by Selody, but is not true in an implicit or lifetime contract model of the labour market.

The "implicit contract" model, one should note, does not suggest that workers bear only the risk associated with adverse investment or other outcomes that increase the cost of the pensions promised under the defined-benefit formula. As noted by a referee, it is unlikely that young workers would enter into implicit lifetime contracts if risk-sharing were asymmetric, with workers receiving lower wage increases or making other concessions in the case of unfavorable outcomes but not receiving higher wage increase or enrichments in the case of favourable outcomes.

18 If there is a non-zero probability that a firm will go bankrupt, then members of DB plans bear investment risk if the plan is not fully funded (in the absence of the full insurance by a third party of accrued pension benefits).

19 If the DB plan promises a nominal benefit, the risk-free nominal interest rate would be used. If the DB plan promises a fully indexed benefit, the risk-free real interest rate would be used.

20 The implications of the mismatch between the assets and liabilities of DB plans has received increased attention in recent years, as in Laidler and Robson (2007).

However, this need not be the case.

Suppose that the contributions required from the sponsor of a DB plan increase sharply as a result of a period of adverse investment outcomes. If the sponsor of the DB plan bears the full risk of adverse investment performance, these higher plan contributions should have no impact on the wages and fringe benefits received by workers in subsequent rounds of formal or informal bargaining. If plan members receive lower increases in wages and/or non-pension benefits as a direct consequence of the employer's having to make larger-than-planned pension contributions, then at least some of the investment risk in the DB plan has been shifted back to the plan members. If there is a dollar-for-dollar reduction in the amount of the workers' wages or other benefits to compensate the employer for the full amount of the higher pension contributions, then all of the investment risk in the DB plan is ultimately borne by plan members.

In the case of favourable investment outcomes, analogous questions arise. Suppose that the sponsor of a DB plan is able to take (or is required by law to take) a contribution holiday as a result of a plan surplus arising from investment returns that exceed the rate of return used to cost the plan. Will the increases in wages or other benefits in succeeding rounds of formal or informal bargaining be the same *or greater than* the increases that would have otherwise been the case? In the presence of favourable investment outcomes, are DB plan members more likely to receive enrichments to past service credits?

In principle, there are two separate questions. First, is there any impact of fluctuations in required

employer contributions to DB plans on the wages or other benefits subsequently received by plan members? Second, if this "feedback" does exist, is it dollar-for-dollar; that is, is the exact amount of the change in the required employer contribution reflected in the subsequent change in wages or non-pension benefits?

To determine whether investment risk in DB plans (especially, with regard to adverse investment outcomes) is shifted to plan members, one might turn first to evidence from formal collective bargaining.

Does the amount of the required employer contribution to the DB plan influence the negotiated wage and/or the level of non-pension fringe benefits? In principle, one might answer this question using econometric techniques and very detailed data on contract provisions, across firms in the same industry or within firms over time. Unfortunately, I know of no study that has addressed this issue with a data set that is sufficiently detailed to produce persuasive findings.<sup>21, 22</sup>

If the return on the plan's assets is beneath the assumed rate, then the funded status of the plan will deteriorate. The plan sponsor will then be required, by law, to make a series of special payments to amortize the resulting shortfalls, known as "experience deficiencies." The *Pension Benefits Standards Act of Ontario* requires employers to fund experience deficiencies calculated on a going-concern basis over a period of not more than 15 years. As well, they must fund experience deficiencies calculated on a solvency or wind-up basis over a period of not more than five years.<sup>23</sup>

21 Hyatt and Pesando (1996) undertake a preliminary, but ultimately inconclusive, econometric study of whether higher employer contributions as a result of investment shortfalls impact on negotiated wage increases.

22 Ideally, one would wish to construct a longitudinal data base which contains the full details for several firms of the entire compensation "package" paid to employees (since unanticipated pension costs can also be shifted back to plan members in the form of fringe benefit reductions), as well as the relevant pension variables. Employer contributions specifically required to amortize experience deficiencies resulting from adverse pension fund investment performance would be included. The ideal data set would cover periods of time in which returns on pension assets fell short of the expectations of plan sponsors, as well as periods of time in which the opposite occurred. In addition, the ideal data set would permit researchers to construct measures of change in the provisions of pension plans since it is possible that unexpected employer contributions are internalized within the pension plan itself, through – for example – the expiry of temporary special retirement "windows" rather than in the level of wages or other fringe benefits. A further confounding consideration that increases the difficulty in isolating the extent of cost-shifting to plan members is that employers can influence the size of pension plan contributions by changing the key actuarial assumptions which underlie the valuation of pension plan assets, notably the assumed real rate of return.

23 Beginning in 2007, a temporary change permits experience deficiencies calculated on a wind-up basis to be funded over a period of not more than 10 years if certain conditions are met.

While this legal requirement clearly assigns the initial incidence of the costs of funding deficiencies on the plan sponsor, the question of the ultimate incidence remains open.

Unfortunately, it is difficult to find hard evidence on the ultimate incidence of employer contributions designed to amortize experience deficiencies. There is, however, ad hoc evidence suggesting that the ultimate incidence of these contributions may be borne by employees as well as by employers.

In 1988, for example, a survey of trustees (both labour and management) of Canadian pension plans, as well as other pension plan administrators and specialists, revealed that 45 percent of respondents believe that smaller wage increases and other enrichments are more likely in the presence of experience deficiencies.<sup>24</sup>

Would retroactive enrichments to flat benefit pension plans in the union sector be less generous if employers were required to fund quickly the unfunded pension liabilities so created? An affirmative answer to this question would suggest that the impact of retroactive plan improvements on the cash flow of the employer – which includes pension contributions – does matter. If plan members tried to negotiate more rapid funding of a retroactive benefit enrichment, the likelihood would appear to be that union members would be required to make a correspondingly greater wage concession in light of the larger employer contributions. If it is also assumed that workers are unwilling to accept an actual reduction in wages (as opposed to a smaller increase), one can perhaps understand why these retroactive enrichments are not aggressively funded.

The question of whether employees negotiate over employer contributions to the DB plan, rather than the pensions provided under the

terms of the DB plan, is the central one.<sup>25</sup> If firms and workers negotiate over costs, the implication is that employees bear at least some of the investment risk in DB plans. If firms and workers negotiate only over benefits, then the implication is that members of DB plans do not bear investment risk.

## Intergenerational Risk Sharing in DB Plans

Even if it is found that the ultimate incidence of all employer contributions to DB plans is borne by employees, DB plans differ from DC plans in an important way. DB plans, unlike DC plans, provide for the sharing of investment risks across different generations of workers, thus reducing the investment risk borne by individual plan members.

Suppose, for example, that investment returns are sharply lower than projected, due to adverse outcomes in both the stock market and the market for fixed-income securities. For a member of a DC plan, especially an older member who is nearing retirement, the consequences for the likely pension at retirement are both clear and adverse. For members of a DB plan, the results may be strikingly different. The immediate impact is that the plan sponsor will be required to make higher plan contributions in order to eliminate, over time, the deficit arising from the investment shortfall. Through formal or informal bargaining, all workers will – over time – make a commensurate concession in wages or other fringe benefits. Older workers who are nearing retirement will bear only a small portion of the immediate increase in pension costs necessitated by the investment shortfall, since this increase is shared by all workers, of all ages, and takes place over time. This capacity for members of DB plans

<sup>24</sup> Cited in Gunderson, Hyatt and Pesando (1992).

<sup>25</sup> A commentator on an earlier draft of this paper has suggested that a relevant test might be to see if members of DB plans make larger wage concessions when the normal employer contributions to the plan increase, such as would be the case when the federal public-service plan was costed on the basis of the lower real interest rates available on the Real Return Bonds of the Government of Canada. This suggestion serves to draw attention to two complicating questions. First, do wages in the federal civil service internalize the value of the DB plan, as would be the case in a competitive labour market? Second, over what length of time would one expect wages to internalize higher employer contributions (even if these are implicit contributions), especially if the event that requires these higher contributions may reverse itself?

to engage in intergenerational risk sharing has no counterpart for members of DC plans. Even if there are substantial runs of favourable or unfavourable investment returns, intergenerational risk sharing within DB plans should significantly lower each individual plan member's exposure to investment uncertainty.<sup>26</sup>

In light of the above, and even if investment risk in a DB plan is ultimately shifted in full to plan members, one should note that DB plans are not simply DC plans in disguise.

## Conclusions

The substantive issues raised in this *Commentary* are as follows.

1. There are three possible scenarios as to the bearing of investment risk in DB plans: (i) plan sponsors bear the risk of adverse and of favourable investment performance; (ii) plan sponsors bear the risk of adverse investment performance, but share the risk of favourable investment performance with plan members; and (iii) plan *members* bear the risk of adverse and of favourable investment performance, at least in the long run.
2. Neither economic analysis nor existing empirical evidence permits a definitive conclusion as to the manner in which investment risk is distributed between plan sponsors and plan members in DB plans. Indeed, the distribution of investment risk may vary across plans, according to the "pension deal." In the absence of definitive evidence, it is not appropriate to argue (for example) that plan sponsors are entitled to plan surpluses because

only plan sponsors bear the downside risk of investment performance.

3. To answer the question of how investment risk is distributed in DB plans, one must seek to better understand the manner in which pension benefits are traded off against other forms of compensation in formal (the union sector) or informal bargaining. Do workers forgo wages or make other concessions based on (i) the size of the employer's *contributions* to the plan or (ii) the pension *benefits* promised under the terms of the DB plan?
4. If workers' wages are adjusted to reflect the *contributions* made by employers to their DB plans, which may be high due to the need to finance investment shortfalls or low to reflect the existence of surpluses arising from favourable investment outcomes, the implication is that plan members bear investment risk, at least over the intermediate to longer term.
5. As many commentators have noted, there are advantages to clarifying the ownership rights to plan surpluses, including those that arise from favourable investment outcomes. If plan sponsors were provided with an unambiguous claim to the ownership of surplus assets, the result would be to remove a potential disincentive to plan sponsors from fully funding their DB plans. However, the argument that plan sponsors should be provided with the proprietary right to plan surpluses because they bear the downside risk of investment performance has, in the opinion of this author, not yet been established (nor, for that matter, refuted).<sup>27</sup>
6. The view that pension benefits represent deferred wages is now widespread, if not universally shared.<sup>28</sup> In spite of this fact, the precise nature of

26 Investment risk is not less in DB plans than in DC plans if both hold similar portfolios. Rather, as noted by a referee, the impact of favourable or unfavourable investment outcomes may be effectively "smoothed" by the capacity for intergenerational risk sharing in DB plans.

27 In deciding how surplus assets might be divided between plan sponsors and members, one would wish to take into account trade-offs between pensions and other forms of compensation as indicated by past practices of the firm or the history of the collective bargaining relationship. A strategy for firms wishing to assert their rights to pension surpluses would be to show that the costs of pension fund shortfalls would be passed on to consumers in the form of higher prices, or shareholders in the form of lower profits, rather than to workers.

28 If there is a decline in the risk-free nominal interest rate, so that the normal cost of an unindexed DB plan increases, will this higher cost be shifted back to employees? Similarly, if there is a decline in the risk-free real interest rate, so that the normal cost of an indexed DB plan increases, will this higher cost be shifted back to employees?

Several referees draw attention to this issue, and use the lack of apparent evidence of this cost shifting as a challenge to the view that employees "pay" for the cost of their DB benefits. If the decline in the risk-free nominal rate of interest proves to be permanent (which, I would suggest, is not yet established), and if sponsors conclude that this higher cost cannot be shifted back to their employees, an economist would predict that firms would close DB plans to new membership or forgo any enrichments to the DB formula. Since DB plans with indexed benefits are largely - if not exclusively - public sector plans, the lack of apparent shifting of costs could reflect the failure of wages in the public sector to internalize pension benefits.

the trade-off between pension benefits and other components of employee compensation, including cash wages, is not clear. Additional research into the nature of this trade-off would be valuable not only in the present context, but also in the assessment of related questions. For example, rational and well-informed workers will grant smaller wage concessions for enrichments to DB plans in which benefits are perceived as risky, due to a combination of less-than-full funding and the possibility of the bankruptcy of the plan sponsor. If workers belong to a poorly funded plan sponsored by a firm that is experiencing financial distress, economic analysis suggests that workers would grant smaller wage concessions for given benefit enrichments than would be the case for workers who belong to a well-funded plan sponsored by a solvent firm.

7. There is much discussion, at present, of the attractiveness (or lack thereof) of “marking to market” the value of a firm’s pension assets and liabilities, so that shareholders may be provided with full information as to any unfunded liability that may represent a claim to shareholder equity.<sup>29</sup> The purpose, presumably, is to facilitate the internalization into share prices of the present value of future – and not yet funded – obligations of the firm to its employees via the vehicle of its DB plan. However, if employees will pay at a

future date for required employer contributions via reduced wages or concessions elsewhere in the compensation package, the unfunded pension liabilities identified by accounting statements do not represent a claim on shareholder wealth. If markets are efficient, and if the above is fully understood by market participants, such unfunded liabilities should not serve to depress share prices. If employees will pay for a *portion* of the required employer contributions, then unfunded pension liabilities will depress share prices, but not on a dollar-for-dollar basis.<sup>30</sup>

This paper has not attempted to provide a comprehensive assessment of the advantages and disadvantages of DB plans compared to DC plans.<sup>31</sup> One conclusion, however, is clear. If plan sponsors do bear all of the investment risk, then members of DB plans clearly bear less risk on this account than do members of DC plans. However, even if the bearing of investment risk in DB plans is ultimately shifted back to employees, the capacity for intergenerational risk sharing reduces the exposure of individual plan members to unexpectedly adverse (or favourable) investment outcomes. This is an especially important consideration for those DB members who are approaching retirement.

<sup>29</sup> See, for example, Laidler and Robson (2007) and Selody (2007).

<sup>30</sup> When market participants receive new information, such as that a firm is experiencing financial distress, an analogous issue must be addressed in order to assess the change in the value of shareholder equity: to what extent will the consequences of this distress be shifted to other stakeholders, such as the firm’s employees?

<sup>31</sup> Ontario’s Expert Commission on Pensions observes that Ontario’s labour force may be becoming more mobile, and individual workers in the future may work for a larger number of employers. It is straightforward to address the issue of portability for DC plans, but not for DB plans.

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